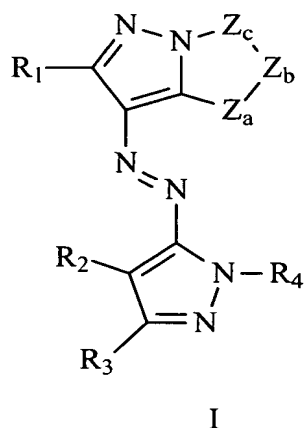


WHAT IS CLAIMED IS:

1. An ink jet ink set comprising:
- a) a cyan ink comprising a carrier and a sulfonated copper phthalocyanine dye;
- 5 b) a magenta ink comprising a carrier and an anthrapyridone magenta dye or metal complex magenta dye, or azo-naphthol derivative magenta dye or mixtures thereof;
- c) a yellow ink comprising a carrier and an azo pyrazoleazole yellow dye of the following structure (I):

10

I



- 15 wherein R₁ represents a hydrogen atom, a cyano group, an alkyl group, a cycloalkyl group, an alkenyl group, an aralkyl group, an aryl group, an alkylthio group, an arylthio group, an acyl group, a carboxyl group, a carbamoyl group, or a heterocyclic group;

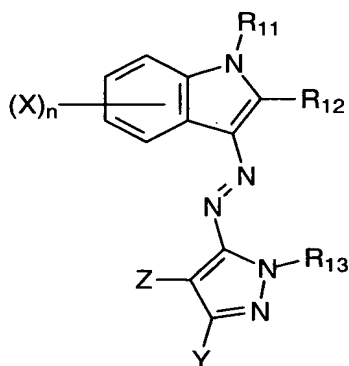
20 Z_a, Z_b and Z_c each independently represents -N=, -C(R₈)= or NH with the proviso that at least one of Z_a or Z_c is -NH; R₈ represents a hydrogen, an alkyl group, an alkenyl group, an alkynyl group, an aryl group or a heterocyclic group;

R₂ represents a hydrogen, an alkyl group, an aryl group, a halogen, a cyano group, a carboxyl group, an acyl group, a carbamoyl group, a nitro group, an

alkyl or aryl sulfone group, a sulfonic acid group, a primary or secondary alkyl sulfonamide group, an aryl sulfonamide group or a heteroaryl group;

R₃ is a hydrogen or any non-metallic group;

5 R₄ is hydrogen, an alkyl group, a cycloalkyl group, an alkenyl group, an aralkyl group, an alkynyl group, an aryl group, a heterocyclic group, a urethane, a sulfoalkyl or sulfoaryl group; or a pyrazoleazoindole yellow dye of the following structure (II);



(II)s

10

(II)

wherein R_{11} and R_{13} each independently represents hydrogen, an alkyl group of 1-6 carbon atoms, an allyl group, an aryl group of 6-10 carbon atoms, a heteroaryl group of 5-10 atoms or a polyoxyalkylene group of 2-20 alkylene oxide residues;

15

R_{12} , X and Y each independently represents hydrogen, an alkyl group of 1-6 carbon atoms, an allyl group, an aryl group of 6-10 carbon atoms, a heteroaryl group of 5-10 atoms, or a halogen, a cyano group, a carboxy group, an acyl group, a nitrogroup, a sulfo group, an alkoxy group of 1-6 carbon atoms, an aryloxy group of 6-10 carbon atoms, an alkoxy- or aryloxy-carbonyl group of 1-10 carbon atoms, a polyoxyalkylene group of 2-20 alkylene oxide residues, a ureido group, a carbamoyl group, an alkyl-, arylalkyl-, aryl-, diaryl- or dialkyl-carbamoyl group of 1-20 carbon atoms, a sulfamoyl group, an alkyl-, arylalkyl-, aryl-, diaryl- or dialkyl-sulfamoyl group of 1-20 carbon atoms, an alkyl- or arylsulfonyl group, an

20

acylamino group, a sulfonylamino group, an amino group, or an alkyl-, aralkyl-, aryl-, diaryl- or dialkyl-amino group of 1-20 carbon atoms;

n represents an integer from 1-4; and Z represents a cyano group, a carboxy group, a sulfo group, an alkoxycarbonyl group, a carbamoyl group, a sulfamoyl group, an alkyl- or arylsulfonyl group, an alkyl-, arylalkyl-, aryl-, diaryl- or dialkyl-sulfamoyl group of 1-20 carbon atom or an alkyl-, arylalkyl-, aryl-, diaryl- or dialkyl-carbamoyl group of 1-20 carbon atoms;

with the proviso that the dye of structure (I) and (II) must contain at least one group capable of imparting water solubility at a pH of about 4-9 and said dyes may contain a counterion if necessary; or mixtures of (I) and (II) above and;

d) a black ink comprising a carrier and a metal complex black dye.

2. The ink jet ink set of claim 1 wherein the yellow dye is represented by Structure I.

3. The ink jet ink set of claim 1 wherein the yellow dye is represented by Structure II.

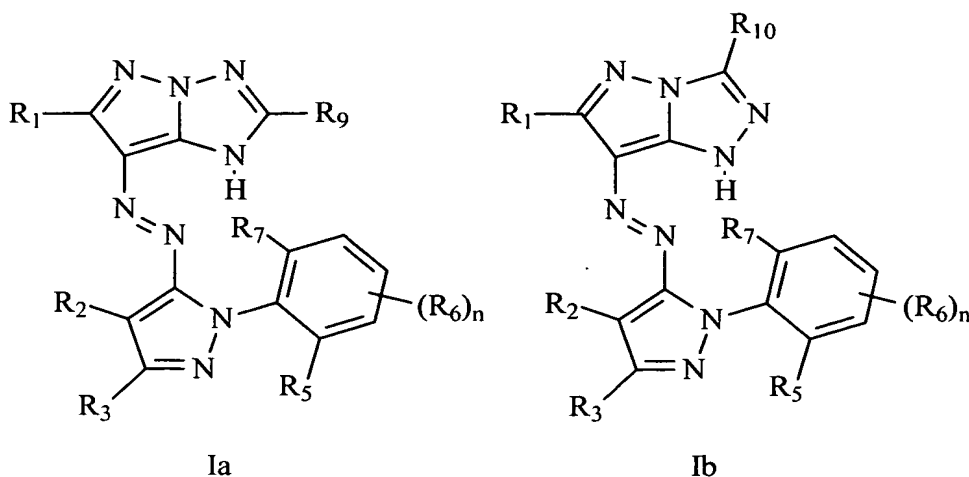
4. The ink jet ink set of claim 2 wherein R_1 is an alkyl group.

5. The ink jet ink set of claim 2 wherein R_2 is a cyano group, an acyl group, a carboxy or carboalkoxy group, or a sulfone.

6. The ink jet ink set of claim 2 wherein R_3 is H or an alkyl group having four or fewer carbon atoms.

7. The ink jet ink set of claim 2 wherein R_1 is an alkyl group, R_2 is a cyano group, an acyl group, a carboxy or carboalkoxy group, or a sulfone; and R_3 is H or an alkyl group having four or fewer carbon atoms.

8. The ink jet ink set of claim 2 wherein the azo pyrazole-triazole yellow dye is represented by structure Ia or Ib:



5

wherein R_1 , R_2 , and R_3 are as defined in claim 2,

R_5 , R_6 , R_7 may independently be H or any non-metallic group, with the proviso that at least one of R_5 or R_7 represents an ionizable group which is capable of imparting water solubility to the dye or R_5 and R_6 or R_6 and R_7 together may form a carbocyclic or heterocyclic ring that is fused to the aromatic ring attached to the pyrazole nitrogen with the proviso that at least one group capable of imparting water solubility to the dye is present in any position of either fused ring or any two adjacent R_6 may form a carbocyclic or heterocyclic ring that is fused to the aromatic ring attached to the pyrazole nitrogen in any two adjacent positions not occupied by R_5 or R_7 , with the proviso that at least one of R_5 or R_7 represents an ionizable group which is capable of imparting water solubility to the dye, and n is 0-3;

R_9 represents a hydrogen, an alkyl group, an alkenyl group, an alkynyl group or a heterocyclic group; and
 R_{10} represents a hydrogen, an alkyl group, a heterocyclic group, an alkenyl group.

9. The ink jet ink set of claim 8 wherein R_1 , R_9 and R_{10} are alkyl groups.

10. The ink jet ink set of claim 8 wherein at least one of R₅, R₆ and R₇ are sulfonate, sulfinate, carboxylate, hydroxyl, phosphonate, or substituted sulfonamide.

5

11. The ink jet ink set of claim 8 wherein R₁ is an alkyl group.

12. The ink jet ink set of claim 8 wherein R₂ is a cyano group, an acyl group, a carboxy or carboalkoxy group, or a sulfone.

10

13. The ink jet ink set of claim 8 wherein R₃ is H or an alkyl group having four or fewer carbon atoms.

14. The ink jet ink set of claim 8 wherein R₅ or R₇ is a sulfonate group and R₆ is a sulfonate or carboxylate group in a position para to the R₅ or R₇ group.

15

15. The ink jet ink set of claim 8 wherein R₉ represents a hydrogen, an alkyl group or an alkenyl or alkynyl group.

20

16. The ink jet ink set of claim 15 wherein R₉ represents a branched or straight chain alkyl group of up to 8 carbons and is substituted with a phenoxy group, and R₁ is a t-butyl group.

17. The ink jet ink set of claim 1 wherein the yellow dye has adequate water solubility to enable preparation of an ink formulation containing between 0.2% and 10% dye.

25

18. The ink jet ink set of claim 8 wherein the yellow dye has adequate water solubility to enable preparation of an ink formulation containing between 0.2% and 10% dye.

30

19. The ink jet ink set of claim 3 wherein R_{11} in the above formula represents hydrogen, a methyl group or a 2-carboxyethyl group.

5 20. The ink jet ink set of claim 3 wherein R_{12} is a methyl or phenyl group.

21. The ink jet ink set of claim 3 wherein X is hydrogen, sulfo, a substituted 1,3,5-triazinylamino group or an N-alkylphthalamido group.

10

22. The ink jet ink set of claim 3 wherein R_{13} is a 4-sulfophenyl, 2,5-bis-sulfophenyl, methyl, phenyl, 4-carboxyphenyl or 3-sulfopropyl group.

15

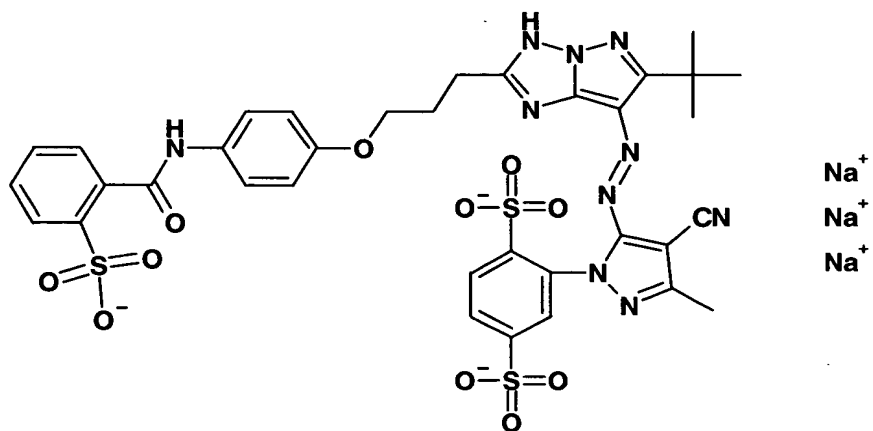
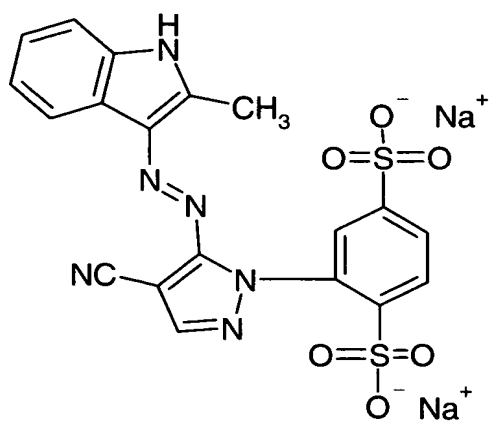
23. The ink jet ink set of claim 3 wherein Y is hydrogen.

24. The ink jet ink set of claim 3 wherein Z is a cyano, carboxy or carbamoyl group.

20 25. The ink jet ink set of claim 3 wherein R_{11} is hydrogen, methyl or 2-carboxyethyl; R_{12} is methyl or phenyl; X is hydrogen, sulfo, a substituted 1,3,5-triazinylamino group or an N-alkylphthalamido group; R_{13} is a 4-sulfophenyl, 2,5-bis-sulfophenyl, methyl, phenyl, 4-carboxyphenyl or 3-sulfopropyl group; Y represents hydrogen and Z is a cyano, carboxy or carbamoyl group.

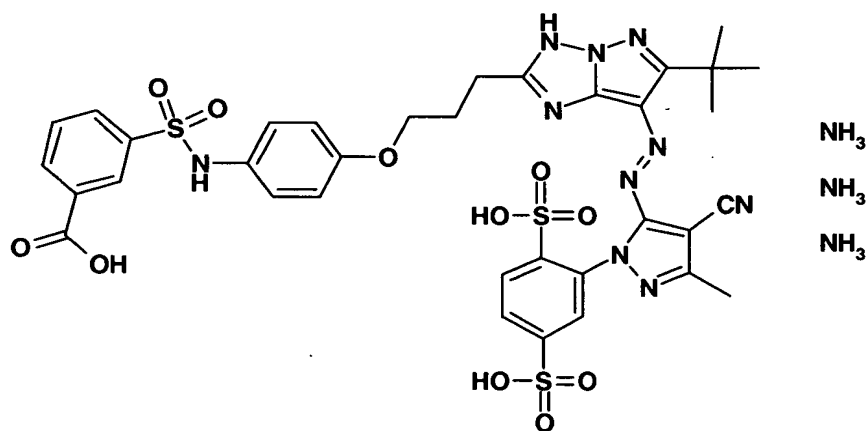
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26. The ink jet ink set of claim 1 wherein the yellow dye is:

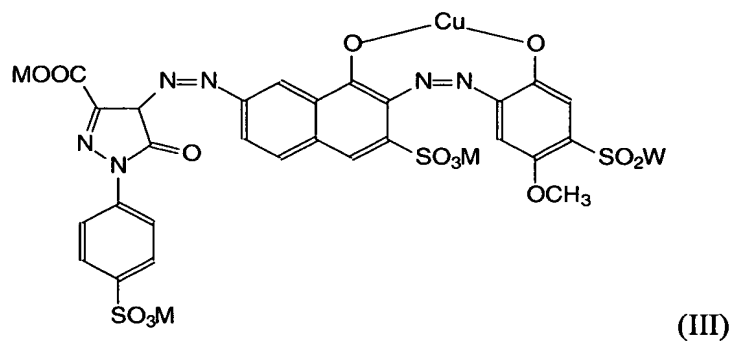


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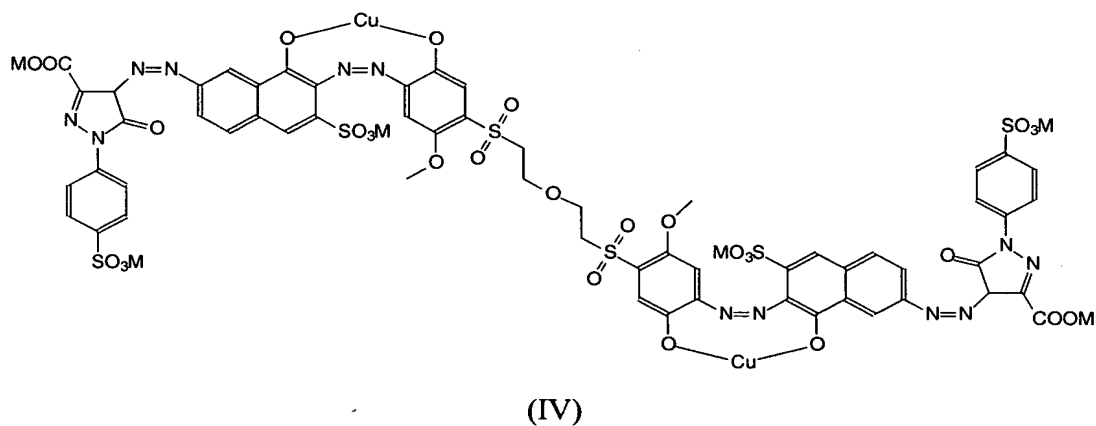
or

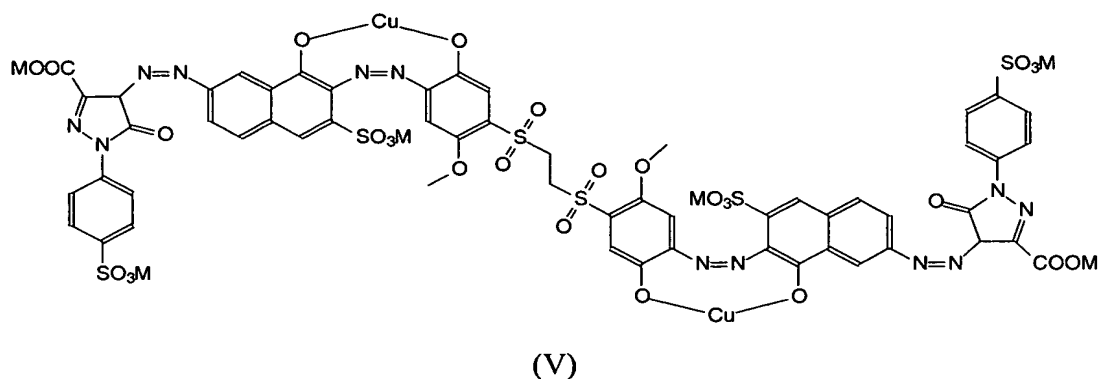


27. The ink jet ink set of claim 1 wherein the metal complex black dye in the black ink is a) Reactive Black 31, b) Pacified C. I. Reactive Black 31 represented by Structure III, IV, or V:



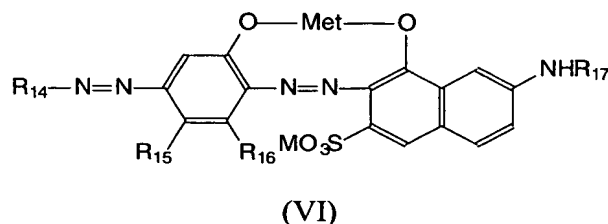
5 wherein W is $-\text{CH}_2\text{CH}_2-\text{OH}$, $-\text{CH}=\text{CH}_2$, an aminoalkyl group; or a sulfoalkyl group ;





wherein M is H, Li, Na, K, NH₄ or alkylammonium or any combination thereof.

c) a metal complex bisazo black dye represented by Structure (VI):



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where R₁₄ is a phenyl group or naphthyl group;

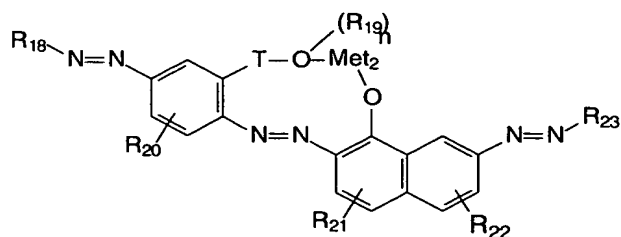
R₁₅ is H, an alkyl group or an alkoxy group with 1 to 18 carbon atoms, an amino group, a halo group, a trifluoromethyl group, a carboxy group, a sulfo group, a carbamido group, an alkylcarbonylamino or arylcarbonylamino group;

10 R₁₆ is hydrogen or R₁₅ forms together with R₁₆ and the phenylene ring a 1,4-naphthylene moiety, which can be unsubstituted or substituted in position 6 or 7;

R₁₇ is H, an alkyl group with 1 to 18 carbon atoms, a cycloalkyl group, a heterocyclic alkyl group, an aryl group, an aralkyl group, a saturated or unsaturated aza, oxa or heterocyclic radical;

15 M is hydrogen, a metal cation, an ammonium cation, or an ammonium cation substituted with an alkyl, alkoxyalkyl or hydroxyalkyl radical each having 1 to 12 carbon atoms; and Met is Cu, Ni, or Zn;

d) or a trisazo metal complex black dyes represented by Structure (VII):



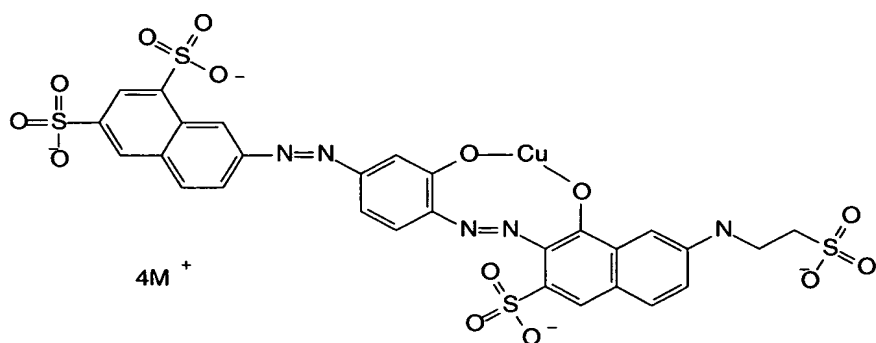
(VII)

wherein Met₂ is a metal atom; R₁₈ is a phenyl or naphthalene radical substituted by 1, 2 or 3 substituents selected from the group consisting of OH, an O(alkyl) group having 1 to 6 carbon atoms, COOM, SO₃M and NH₂;

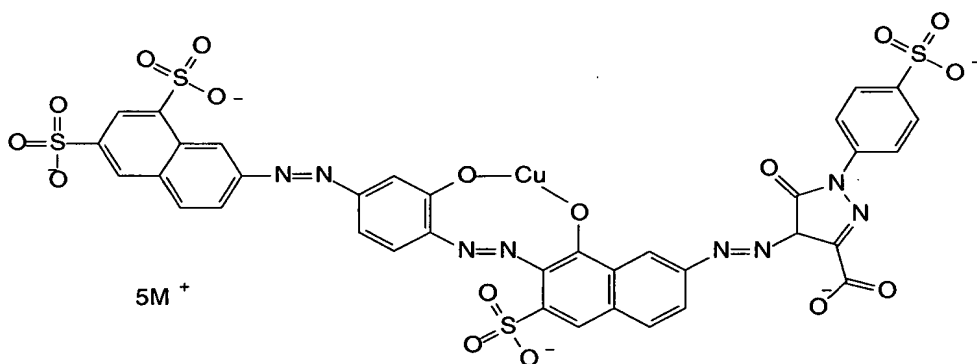
- 5 R₁₉ is an alkyl group of 1 to 6 carbon atoms,
T is a chemical bond or -CO- or -SO₂- ;
R₂₀ is H, a methyl group or an O(alkyl) group having 1 to 6 carbon atoms;
R₂₁ and R₂₂ are each independently H, COOM or SO₃M;
R₂₃ is a phenyl, pyridyl or pyrazole radical substituted by 1,2 or 3
10 substituents selected from the group consisting of OH, an O(alkyl) group having 1 to 6 carbon atoms, COOM, SO₃M, NH₂, an NHaryl group, an NHacyl group and a phenylsulfo group;
n is 0 or 1, and M is ammonium, H, K, Li, or Na:
or mixtures of any number of dyes a), b), c), or d).

15

28. The inkjet ink set of claim 27 wherein the black ink comprises a carrier and pacified reactive black 31 or a dye of structure VIII or structure IX or mixtures thereof,



VIII



IX

5

wherein M in is Li, Na, K, NH_4^+ or any combination thereof.

29. The ink jet ink set of claim 1 wherein the cyan ink comprises a
 10 carrier and C. I. Direct Blue 86, C. I. Direct Blue 199, or C. I. Direct Blue 307 or mixtures thereof.

30. The ink jet ink set of claim 1 wherein the magenta ink
 comprises a carrier and Kodak Lightfast Magenta 1 (CAS # 251959-65-6), C. I.
 15 Reactive Red 23, pacified C. I. Reactive Red 23, C. I. Reactive Red 31, pacified Reactive Red 31 or CAS # 182061-89-8, Nippon Kayaku JPD EK-1 (CAS# 224628-70-0), Acid Red 80, Acid Red 82, or CAS# 212080-60-9 or mixtures thereof.

31. The ink jet ink set of claim 2 wherein the black ink comprises at least one metal complex black dye and at least one yellow dye selected from dyes I and II.

5 32. The ink jet ink set of claim 1 wherein the ink set further comprises a light cyan ink and a light magenta ink.

33. The ink jet ink set of claim 32 wherein the light cyan ink comprises a carrier and a sulfonated copper phthalocyanine dye.

10

34. The ink jet ink set of claim 33 wherein the light cyan ink comprises a carrier and C. I. Direct Blue 86, C. I. Direct Blue 199, or C. I. Direct Blue 307 or mixtures thereof.

15 35. The ink jet ink set of claim 32 wherein the light magenta ink comprises a carrier and an anthrapyridone magenta dye, a metal complex magenta dye or an azo-naphthol derivative magenta dye, or a mixture thereof.

36. The ink jet ink set of claim 32 wherein the light magenta ink comprises a carrier and Kodak Lightfast Magenta 1 (CAS # 251959-65-6), C. I. Reactive Red 23, pacified C. I. Reactive Red 23, C. I. Reactive Red 31, pacified C. I. Reactive Red 31, CAS #182061-89-8, Acid Red 80, Acid Red 82, Nippon Kayaku JPD EK-1 (CAS# 224628-70-0) or CAS# 212080-60-9, or mixtures thereof.

25

37. The ink jet ink set of claim 32 wherein the ink set further comprises a light yellow ink.

38. The ink jet ink set of claim 37 wherein the light yellow ink comprises a carrier and yellow dye I or II, or mixtures thereof.

30

39. The ink jet ink set of claim 1 wherein the ink set further comprises a light black (gray) ink comprising a carrier and a metal complex black dye, a carbon black pigment, a self-dispersing carbon black pigment or mixtures thereof.

5

40. The ink jet ink set of claim 1 wherein the carrier comprises water and water soluble organic solvents, humectants or a combination thereof.

41. The ink jet ink set of claim 40 wherein the humectants are
10 selected from diethylene glycol, glycerol, diethylene glycol monobutyl ether, triethylene glycol monobutyl ether, 1,2-hexanediol, 1,5-pentanediol, urea, 2-imidazolidone, pyrrolidin-2-one, 2-ethyl-2-hydroxymethyl-1, or 3-propanediol, and mixtures thereof.

42. The ink jet ink set of claim 41 wherein the concentration of
15 humectants is 5% to 60% by weight.

43. The ink jet ink set of claim 40 wherein the carrier further
20 comprises a non-ionic surfactant.

44. An ink jet printing method comprising the steps of A) providing an ink jet print that is responsive to digital signals; B) loading said printer with an ink jet recording element comprising a support having thereon an image receiving layer; C) loading said printer with an ink jet ink comprising the
25 ink set according to claim 1; and D) printing on said image receiving layer using said ink jet ink compositions described in claim 1 in response to said digital data signals.